



**Title: Battery Saver Message Displayed on the DIC**

**Date: 11/13/2019**

**Vehicles: 2010-2011 Saab 9-5**

**To: All Saab Service Departments**

**From: Saab Technical Assistance**

---

**Condition/Concern:**

Battery Saver Message is displayed on the DIC. The 2010-11 Saab 9-5 and the 2011 9-4x have a complex charging system. The system is described below to aid diagnostics.

**Recommendation/Instructions:**

The following service information was presented when the vehicle launched in Sweden, this may help to diagnose the system.

**Also see WIS path**

9-5 (9650) / 2011 / Electrical system / Charging and starting system / Technical description / Charging System Description and Operation

And

9-5 (9650) / 2011 / Electrical system / Charging and starting system / Technical description / Load Shed System Description and Operation

**EPM (Electrical Power Management) Overview**

The electrical power management system is designed to monitor and control the charging system and send diagnostic messages to alert the driver of possible problems with the battery and alternator. This electrical power management system primarily utilizes existing on-board computer capability to maximize the effectiveness of the alternator, to manage the load, improve battery state-of-charge and life, and minimize the system's impact on fuel economy.

The electrical power management system performs 3 functions:

- It monitors the battery voltage and estimates the battery condition.
- It takes corrective actions by boosting idle speeds and adjusting the regulated voltage.
- It performs diagnostics and driver notification.

The condition of the battery is assessed during ignition on and ignition off. The battery charge status is determined during ignition off by measuring the voltage in the open circuit. The SOC (state-of-charge) is a function of the acid concentration and the internal resistance of the battery and is estimated by reading the battery open circuit voltage when the battery has been at rest for several hours.

The state-of-charge can be used as a diagnostic tool to tell the customer or the dealer the condition of the battery. Throughout ignition-on, the algorithm continuously estimates state-of-charge based on adjusted net amp hours, battery capacity, initial state-of-charge, and temperature.

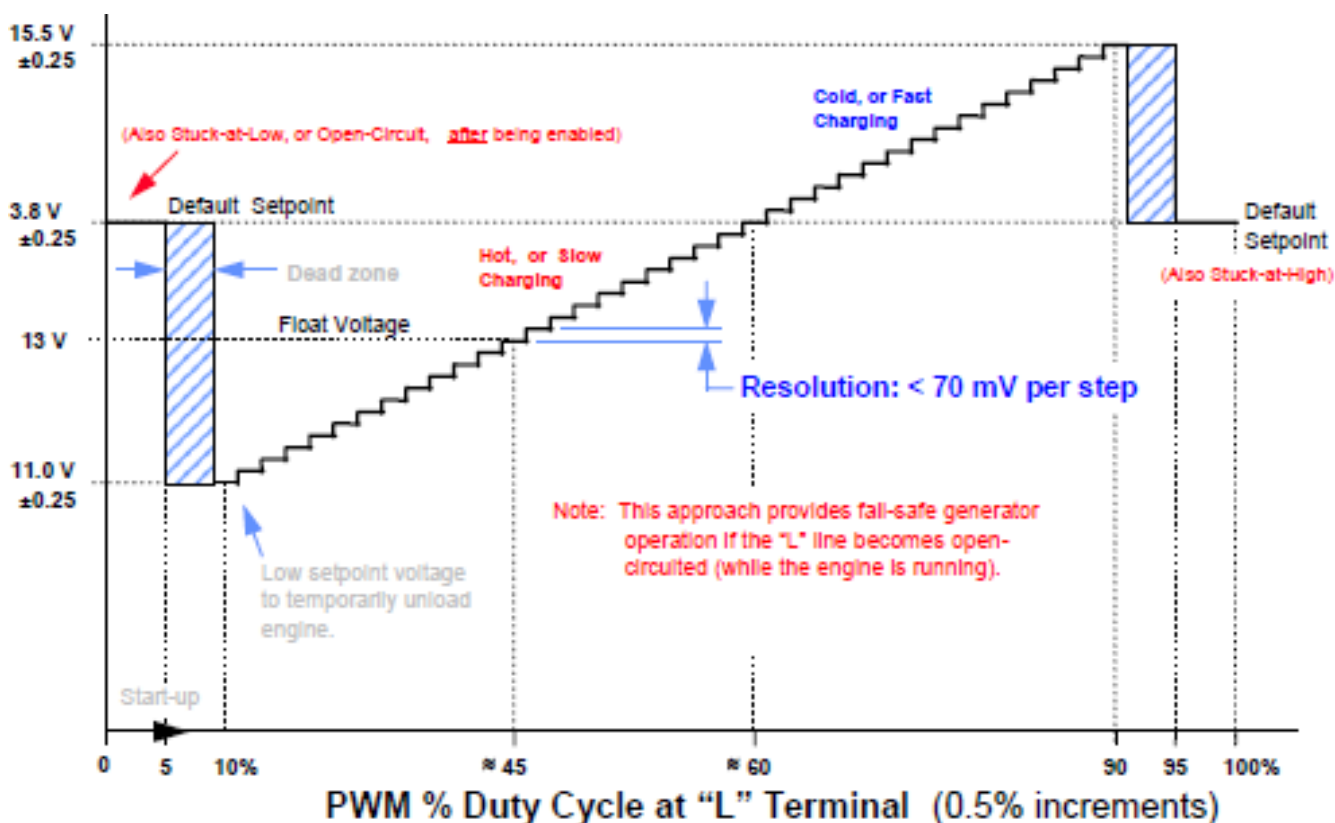


While running, the battery degree of discharge is primarily determined by a battery current sensor, which is integrated to obtain net amp hours.

In addition, the electrical power management function is designed to perform regulated voltage control to improve battery state-of-charge, battery life, and fuel economy. This is accomplished by using knowledge of the battery state-of-charge and temperature to set the charging voltage to an optimum battery voltage level for recharging without detriment to battery life.

### Regulated Voltage Control

The Regulator Voltage Control (RVC) will result in the battery being charged at its optimum voltage for each certain voltage mode. The optimum battery charge voltage will be converted to a percent duty cycle command that will be sent to the ECM via serial data link. The ECM will then place the 128 Hz PWM Duty Cycle on the L line. The regulator in the generator will then adjust the regulated voltage set point according to the commanded duty cycle (see figure). When the generator is at full field the RVC algorithm is unable to control the generator-regulated voltage.



### Battery SOC

SOC (state of charge) is defined as the remaining capacity (in amp-hours) in a battery when a fully charged battery is discharged with a constant current (C20-rate capacity) in 25Cdeg until the battery reach 10.5V. are referenced to C20-rate capacity. The SOC is expressed in a percentage value and ranges from 0% to 100%.



The SOC calculations in the EPM system can be determined in two ways.

1. If the cars have been switched off for more than 16h the battery voltage (Open Circuit Voltage OCV) is measured and the SOC calculated by using values stored in a programmed table.
2. During running and key ON position, the State Of Charge (SOC) is calculated by a current sensor mounted between the batter (-) pole and chassis ground.

### Diagnostic

Diagnostics are used to ensure that the system is working properly and the proper Diagnostic Trouble Codes (DTCs) or Telltales are activated when an error occurs in the system. Subsystem and Generator faults will be tested to ensure that the system responds correctly to these types of errors concerning the RVC system.

### Diagnostic Trouble Codes (DTCs) Table

GMLAN Signal	Parameter Name	DTC	Cluster with DIC	
			Battery Telltale	DIC Message Display
	Battery Voltage Sense Fault	B1517.5A	No	No
Service Battery Charging System Indication On	Low Battery Voltage	B1517.03	Yes	Service Battery Charging System
Service Battery Charging System Indication On	High Battery Voltage	B1517.07	Yes	Service Battery Charging System
	Battery Current Sensor Performance	B1516.08	No	No
Service Battery Charging System Indication On	Current Sensor Polarity Check	B1516.66	Yes	Service Battery Charging System
	High Parasitic Load	B1527.00	No	No
Battery Saver Indication On	Energy Management Load Shed No3	-	No	WBattery Saver Active
Battery Voltage Indication	Low Voltage	B151A.58	No	Low Battery

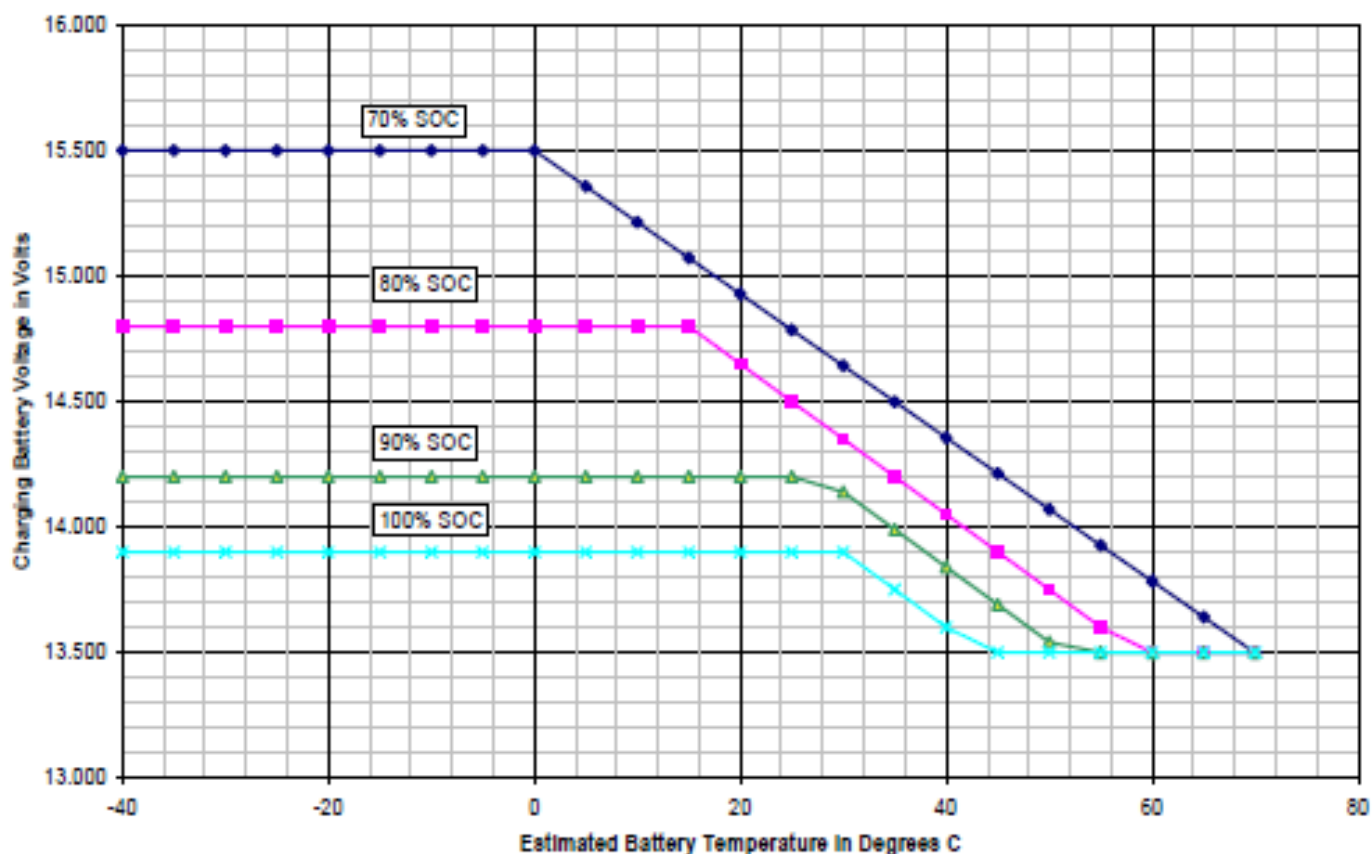
If any DTC is set and if all of the conditions required to set this particular DTC are cleared, the problem corrects itself after some seconds.



### Functional description EPM

The purpose of the Electric Power Management feature is to maintain engine startability and prevent vehicle failures due to discharged batteries. When the battery State-of-Charge (SOC) is low, the vehicle's engine idle speed is increased slightly. When the battery SOC continues to drop, the rear defog, heated seats, and heated mirrors may be momentarily shut off. As an extreme measure, when the battery SOC is very low, the A/C compressor and engine cooling fan after-blow may also be turned off. Once the battery SOC reaches an appropriate level, these items will be turned back on. These measures should be rarely visible to the customer, except during the extreme measures.

Charging Voltage For Different Battery SOC's and Temperatures



### Normal operation mode

In normal operation mode the system voltage is calculated based on the actual battery temperature and the SOC. Therefore an array of curves is used, representing optimal charging conditions.



## **There are functionalities of the EPM System that cause different voltage behaviors like:**

- **Start-Up voltage boost**

Battery recovers charge lost during cranking it occurs after every ignition cycle and it lasts 30 seconds

- **Headlamp Mode**

Purpose of this mode is to maintain optimum headlamp system performance anytime the EPM system is in any low voltage modes

- **Wiper Mode**

Purpose of this mode is to maintain optimum wiper system performance anytime the EPM system is in any low voltage modes

- **Sulfation Mode**

Battery voltage increase to optimum battery charging voltage for a short time (3-5 minutes) to avoid sulfation. Battery sulfation mode occurs any time the battery voltage has been at 13V or below for more than 45 minutes.

- **Plant Assembly Mode**

Improve battery warranty during assembly and while the vehicle is located at the dealer for the first x miles.

- **Voltage Reduction Mode**

Voltage reduction mode's purpose is to reduce the voltage under certain conditions, anytime the battery is fully charged.

- **Fuel Economy Mode**

To save fuel, the RVC generator will only provide power to the system if the battery is fully charged and even drain the battery to a lower SOC in certain conditions

- **Climate Control Voltage Boost request**

This request will be used if the RVC control algorithm is in Voltage Reduction mode or in Fuel Economy mode.

### ***Idle Speed***

During periods of high electrical loads and battery discharging, the engine idle speed is increased to increase the generator output.

The IB noticeability is with respect to Creep Torque, Audible Noise and Vibration. The maximum degree of noticeability may vary as a function of Resonances, Temperature or Gear.

- **Idle Boost 0** is defined as the normal or base operating mode (with respect to EPM) with no idle boost requested.

- **Idle Boost 1** is defined as the maximum rpm without being noticeable by 95% of all customers with the engine cooling fans at low speed, the radio off, and the HVAC blower at medium speed.



- **Idle Boost 2** is defined as the maximum rpm without being noticeable by 75% of all customers with the same loads as for level 1. Thus with the engine cooling fans at high speed, or the radio on at moderate volume, or the HVAC blower at high speed, Level 2 will be unnoticeable by more than 75% of all customers. If it is noticeable it should not be objectionable.

- **Idle Boost 3** is defined as the maximum rpm without excessive creep torque. It is expected to occur very rarely, and to be noticeable by 75% of all customers and it requires driver notification to prevent warranty claims.

### ***Load Shed***

If an increased idle speed doesn't result in suitable voltages, an additional feature will be enabled called Load Shedding which will reduced or entirely turned off some certain electrical loads. The loads that may be reduced or turned off are considered customer convenience rather than customer safety features.

### **Examples of loads are:**

Heated seats, Heated rear window defogger, Heated exterior mirrors, HVAC blower

- **Load Shed 1**

Reduces load: HVAC blower

- **Load Shed 2**

Reduces load: HVAC blower

- **Load Shed 3**

Turns off: heated seats, heated rear window defogger, heated exterior mirrors, HVAC blower

**If EPM activates Load Shedding Level 3, a message will display in the IPC:  
"Battery Saver active!"**

### **For More Information Contact**

[tac.us@orio.com](mailto:tac.us@orio.com)

**1-855-722-2762 X3**

SAAB bulletins are intended for use by professional technicians, not a "do-it-yourselfer". They are written to inform technicians of conditions that may occur on some vehicles or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions and know-how to do a job properly and safely. If a condition is described, do not assume that the document applies to your vehicle or that your vehicle will have that condition. Contact your SAAB Official Service Center for information on whether your vehicle may benefit from the information.